Greening Project Status Report

The White House

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Greening of the White House
Status Report and Accomplishments

1. Introduction

The White House complex comprises the Executive Residence, the East and West Wings, and the Old Executive Office Building. The White House was designed in 1792 and was first occupied in 1800. It serves many functions; it is a residence, an office complex, and the setting for special events, dinners, and other state functions and ceremonial occasions.

The White House

The White House grounds also contain recreational areas, which include a swimming pool and a running track made of recycled materials as well as gardens and lawns. It has often been at the forefront of technological advances. For example, when plumbing was first installed in the 1830s, it was one of the first houses in the country to have running water. Later, in the early 1900s, a central air-conditioning system was installed that ultimately didn't work. Today, the White House complex's east-west orientation permits the use of daylighting and passive solar heating, among other energy-efficient measures.

The Old Executive Office Building was completed in 1888. It has more than 550 offices in 600,000 square feet of space. It was originally designed to make use of daylighting, and it had an intricate system permitting natural ventilation. The ventilation system is no longer operating, but the skylights have been returned to their original function. Renovations of the Old Executive Office Building began in 1981, managed by the Office of Administration of the Executive Office of the President in cooperation with the General Services Administration (GSA).

Townhouse offices on Jackson Place were added to the Greening of the White House project in 1998. During the 19th century, they were used as residences; they were converted to offices in the early 20th century.

2. Context of the Project

The Greening of the White House project began during the Clinton Administration. And on May 3, 2001, President George W. Bush announced that the Chief of Staff would again review energy usage in the White House. "Since I've asked other agencies to review their policy, I'm going to ask the White House to do the same. We want to be good, efficient users of energy in the White House," the President said. The purpose of the project is to demonstrate to the nation numerous energy-efficient measures that can be adopted by millions of Americans in their homes and offices. The White House context has affected this greening project in several ways.

First, the historic character of the buildings has to be preserved, so visible modifications to the exterior and the interior have to be limited. Second, security is always an important consideration. Third, some energy-efficient strategies, although cost-effective from a life-cycle perspective, might have appeared extravagant because of their initial costs, so they were not

implemented. Fourth, a significant amount of energy that is associated with the building's operations cannot be controlled by White House staff; these include the extensive press operations on the lawn and in the press offices. Fifth, several agencies are involved in managing the White House complex, including the Office of the President, the GSA, and the National Park Service (NPS); this requires a considerable amount of coordination and cooperation. Finally, the White House is exempt from Federal procurement regulations, so procurements can move more quickly and include new technologies more easily than they can in many other facilities.

3. The Design and Decision Process

The Greening of the White House initiative was announced by President Clinton in 1993 to make the complex "a model for efficiency and waste reduction." The initiative resulted in an action plan that contained strategies in five areas: energy efficiency; building ecology; air, water, and landscape; materials, waste, and resource management; and managerial and human factors.

Three major activities were carried out in the year following the announcement. First, an energy audit was conducted by the Department of Energy (DOE), with support from Lawrence Berkeley National Laboratory, the National Renewable Energy Laboratory (NREL), and the Rocky Mountain Institute. This audit examined the major systems that affect energy use: building shell, lighting, plug loads, and heating, ventilation, and air-conditioning (HVAC); it also addressed water use and efficiency.

The second major activity was an environmental audit. The team was led by the Environmental Protection Agency (EPA), with support from the District of Columbia and the Institute for Environmental Auditing. This audit examined compliance with applicable regulations as well as opportunities for pollution prevention.

Finally, a feasibility study was sponsored by the American Institute of Architects (AIA). The AIA organized a design charrette (a highly focused, interactive brainstorming session for the design team) involving more than 90 experts in architecture, interior design, engineering, building operations, and environmental concerns. The charrette produced short-term and long-term recommendations for improving energy efficiency and environmental performance. The recommendations emphasized actions that were cost-effective and that used commercially available, "off-the-shelf" technologies.

Reclaimed skylights in the Old Executive Office Building

The initiative produced a *Phase 1 Action Plan* on March 11, 1994. DOE issued a follow-up Six-Year Report in November 1999.

Responsibility for greening activities has been spread across several agencies. Within the Executive Residence, the White House Ushers Office has oversight responsibility. The GSA has responsibility for the East and West Wings of the White House and the Old Executive Office Building. The NPS maintains the grounds and the guard stations.

4. Highlights of Environmental Strategies and Accomplishments

Several people involved in these activities have said that the greening process has been very beneficial, both in highlighting potential measures and strategies and also in stimulating action by providing a mandate and visibility for those activities.

During the greening initiative process, recommendations were developed in several areas. Descriptions of the status of these recommendations and subsequent activities are presented in the table at the end of this report. Highlights of activities at the Executive Residence, the East and West Wings, and the Old Executive Office Building follow.

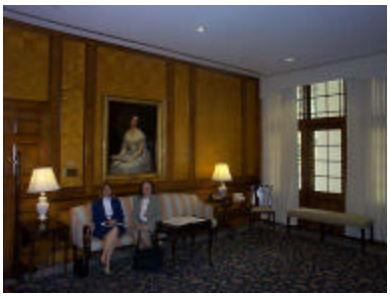
All of the windows in the Old Executive Office Building were replaced.

Building Envelope

Improvements to the building envelope include a new roof for the Executive Residence and replacement of 98% of the windows in the Old Executive Office Building with double-paned, low-emissivity window units.

Lighting

Incandescent lamps were replaced by compact fluorescents in table lamps and corridors for an energy savings of 350,000 kilowatt-hours (kWh) per year and $22,815 in energy costs. A few historic fixtures could not accommodate the compact fluorescent bulbs, so the incandescent bulbs were retained. Fluorescent fixtures were retrofitted with T-8 tubes and electronic ballasts for a savings of more than $100,000 per year. In addition, the original skylights in the Old Executive Office Building were rehabilitated to provide light to stairwells and corridors.



Compact fluorescent table lamps and environmentally preferable materials and cleaning supplies are used in the White House.

Plug Loads

A superefficient "Golden Carrot" refrigerator was installed in the Executive Residence. Since 1995, 99% of the office equipment purchased has been Energy Star®-rated (by the DOE/EPA program for efficient appliances and consumer electronics), and staff are required to turn off computers after work. Both high-voltage and low-voltage electrical equipment in the Executive Residence were upgraded from the transformers, switchgear, main switchboards, and distribution panelboards that had been installed during the 1948-1950 renovation.

HVAC

A new HVAC system was installed in the Residence; this system saves 400,000 kWh and $32,000 per year and uses HFC-134 rather than CFC coolant. Other systems have been upgraded, including window air-conditioning units (with timers and with some new units having an energy-efficiency rating [EER] beyond 9.5), the chiller system, pipe insulation, steam radiators, and steam traps. The use of renewable energy resources was discouraged by the higher first cost of a system, which might have made it appear to be an extravagance.

HVAC Alternatives for South Side Barriers

The South Side entry and exit booths are currently designed with a split-system air-cooled heat pump, including a ceiling-mounted indoor fan coil unit and an outdoor, pad-mounted condensing unit. NREL has recommended a ground-source heat pump as an alternative system.

The ground-source heat pump includes a ceiling-mounted, indoor water-to-air heat pump unit, somewhat larger than the existing fan coil unit design, but the exterior system does not have above-ground components. A small fractional horsepower pump above the ceiling circulates water between the indoor fan coil unit and an outdoor underground array of high-density polyethylene piping. The water continuously circulates in this closed-loop system, transferring heat from the indoor unit to the ground when in an air-conditioning mode and extracting heat from the ground when in a heating mode. The International Ground Source Heat Pump Association has published procedures and guidelines for the design and installation of ground-source heat pumps. This organization also facilitates training in designing and installing the systems. It also maintains an informative Web site at http://www.igshpa.okstate.edu/.

Materials

Purchasing agents use green buying standards to acquire building materials, cleaning supplies, inks for printing, and the like**.**

Indoor Environmental Quality: Air

A nonsmoking policy is in effect. From 1995 to 2000, 60% of the rooms in the Old Executive Office Building had been painted using paints with low levels of volatile organic compounds (VOCs); the remaining rooms are painted with oil-based paints because of historic considerations.

Skylights in the Old Executive Office Building

Indoor Environmental Quality: Daylighting

Skylights that had been blocked out in the Old Executive Office Building were returned to their original condition, providing daylight to the interior of the building.

Water

Water-conserving fixtures and devices have been installed in restrooms, kitchens, and other areas. A chiller was modified to recirculate cooling water.

Landscaping

The use of fertilizer has been reduced by one-third, and pesticide use has been reduced by 80%. Native plants have been emphasized since 1995. Watering was switched to early morning hours, which saved 1,500 gallons in one year. Trimmings and yard waste are composted off site.

Solid Waste Management/Source Reduction and Recycling

Documents are copied on both sides of recycled paper containing 30% post-consumer waste. Most documents are shredded into fibers too small for recycling, so this material is composted with yard waste.

Recycling center at the White House

Hazardous Waste/Toxic Substances Management

Several steps were taken to ensure the proper management, handling, and storage of hazardous materials. These steps included making agreements on procedures, consolidating hazardous waste storage, improving recordkeeping, and ensuring that transformers do not contain polychorinated biphenyls (PCBs).

Managerial and Human Factors

A team was established to create an environmental management program. Currently, several "champions" of the greening efforts continue to lead their organizations.

The buildings on Jackson Place were not part of the original greening design charrette, but were added in 1998. Energy and indoor air quality audits were conducted to identify needed improvements. Greening activities include the following:

- Replace all the windows with double-glazed windows
- Install weatherstripping, at an estimated savings of $13,000 per year
- Finish conversion of T-12 to T-8 fixtures and electronic ballasts

- Replace incandescent bulbs in table lamps with compact fluorescents
- Install motion sensors in areas with sporadic activity and maintain constant light levels in rooms with dimmable lighting systems, at an estimated savings of $3,000 per year
- Install ceiling fans, at an estimated savings of $2,300, based on lower thermostat settings
- Correct problems with makeup air systems
- Investigate HVAC upgrades such as high-pressure HVAC lines
- Improve labeling of recycling containers
- Work with EPA to establish a collection system to recycle nickel-cadmium batteries.

5. References and Sources

U.S. Department of Energy et al. *The Greening of the White House: Phase I Action Plan*, March 11, 1994.

U.S. Department of Energy. *The Greening of the White House: Six-Year Report*, November 1999; available online at http://www.eren.doe.gov/femp/techassist/pdf/gotwh.pdf.

Interviews were conducted with the following individuals:

- Kerry K. Bonos, Safety and Occupational Health Specialist, White House Property Management Center, General Services Administration
- Dennis Fremeyer, White House Ushers Office
- Larry Handeland, Associate Director, Facilities Management Division, Office of Administration, Executive Office of the President
- Michael Summerlin, Assistant Director for Design and Construction, National Park Service White House Liaison Office
- Irv Williams, Superintendent, White House Grounds

Status of Greening Activities

Building Envelope	
Actions Implemented	Comments
Replace executive residence roof with lead-coated copper roof installed over rigid board thermal insulation	New roof is historically correct, more durable, and will improve the slope; insulation added
Replace 98% of Old Executive Office Building (OEOB) windows with double-pane units containing a low-e film	Annual savings of 470 MBtu, $8,000; remaining 2% not replaced because of historic considerations
Actions Not Implemented	Comments
Replace or retrofit winter enclosure for north portico	Funding not available
Plan for solarium and greenhouse reglazing with high-performance glass	Work planned for Summer 2000
Lighting	
Actions Implemented	Comments
Replace incandescent bulbs in table lamps and corridor lighting with compact fluorescent bulbs in residence and OEOB	Annual savings of 350,000 kWh (1.2 billion Btu), $22,815; 5% of bulbs not replaced because of historic character of fixtures and security concerns
Replace exterior façade lighting with halogen fixtures	Annual savings of 36,000 kWh (123 million Btu), $2,160; timers turn off spotlights at 11 p.m.
Retrofit fluorescent fixtures in service areas using T-8 bulbs, electronic ballasts, and controls in Residence	Annual savings of 111,000 kWh (379 million Btu), $7,759
Replace 23 300-W incandescent bulbs in paint shop with triple-phosphor fluorescent lamps	Annual savings of 14,400 kWh (49 million Btu), $1,000; not in 1994 action plan
Replace T-12 bulbs with T-8 tubes, electronic ballasts, and reflectors in East and West Wings, OEOB	Annual savings of 1,634,644 kWh (5,577 million Btu), $98,078; 90% have been upgraded; remainder cannot be replaced for security reasons
Retrofit mercury vapor with metal halide lights in Indian Treaty Room in OEOB	No annual savings but 35% more light
Install motion sensors in rest rooms, copy rooms, and conference rooms in OEOB	Annual savings of 100,000 kWh (341 million Btu), $6,054; not in 1994 action plan
Rehabilitate historic skylights in OEOB	Completed in 1995
Convert to LED exit signs	Annual savings of 280 kWh and $25 per sign
Install photovoltaic-powered lighting for Pennsylvania Avenue park and visitors kiosks	Photovoltaics found to be uneconomical and aesthetically inappropriate for this application; instead, alternative heat pumps will be installed in four guard houses
Study lighter, more reflective paint	Begun in 1994
Plug Loads	
Actions Implemented	Comments
Install super-efficient “golden carrot” refrigerator in Executive Residence	Annual savings of 2,316 kWh (8 million Btu), $175
Install more efficient coolers in kitchen and flower shop in Residence	Not in 1994 action plan
Upgrade high- and low-voltage electrical equipment in Residence	Transformers, switchgear, main switchboards, and distribution panelboards, installed during 1948-1950 renovation, were obsolete and had reached load capacity
Initiate policy to purchase only Energy Star®-rated office equipment	Since 1995, 99% of office equipment purchased is Energy Star; energy consumption reduced 50-60%; staff required to turn computers off after work to save energy and promote security

HVAC	
Actions Implemented	Comments
Install new HVAC system in residence using HCF-134 (non-CFC) coolant	Annual savings of 400,000 kWh (1.4 billion Btu), $32,000
Upgrade 208-V window unit air conditioners beyond 9.5 EER; install timers on all window units to turn off from 10 p.m. to 5 a.m. in OEOB	Annual savings of 70,550 kWh (241 million Btu), $4,621; 85% of units have been replaced thus far
Institute CFC management system	Completed in 1994
Ensure refrigerant and CFC technicians have EPA-approved training	Completed
Ensure chiller recycling/ recovery/ reclamation machines meet regulations	Completed
Modify chiller system to recirculate cooling water	Completed in 1994
Establish preventive maintenance program for kitchen freezer leaks	Established in 1994
Install new insulation on all pipes	Work begun in 1998
Upgrade steam radiators with thermostatic control valves	Action initiated
Replace steam traps to prevent steam loss	90% complete
Actions Not Implemented	Comments
Rezone steam heating system for better control of steam distribution	
Use of renewable resources	A PV array was proposed for the roof of the residence but first costs were too high
Materials	
Actions Implemented	Comments
Use green buying standards	Carpenters look at engineered vs. solid wood and consider binders; look for products with less cleaning and maintenance requirements; inks that contain biodegradable vegetable ingredients are used for printing
Follow Executive Order 12873	Used furniture is refurbished
Develop education and awareness program	Plan completed in 1994
Indoor Air Quality	
Actions Implemented	Comments
Continue no-smoking policy throughout	Ongoing
Improve paint shop operations and housekeeping	New paint shop completed in 1995; more efficient paint sprayer installed in 1999
Use low-VOC paints	Starting in 1995, 60% of rooms in OEOB have been painted with low-VOC paints; remaining rooms are painted with oil-based paints because of historic considerations
Water	
Actions Implemented	Comments
Install water conservation devices in rest rooms, kitchens, and other areas	Devices installed in 1994
Consider installing submeters	Began in 1994
Change chiller system to recirculate cooling water	Completed in 1994
Move hazardous waste storage area away from drains	Completed in 1993
Prepare spill prevention and countermeasures plan	Completed in 1994

Landscaping	
Actions Implemented	Comments
Reduce fertilizer use	Fertilizer consumption reduced by one-third by using mulching mowers and increasing use of compost
Continue to use and improve integrated pest management plans	Pesticide use reduced 80%
Increase use of native plants	Native plants used since 1995; strive for a "natural park" appearance
Replace seasonal flowerbeds with perennials and shrubs	Replaced in 1998; reduces maintenance requirements
Adjust or replace sprinkler heads and water in early morning	Sprinkler heads adjusted or replaced in 1994 and watering switched to early morning whenever possible; saved 15,000 gallons of water in one year; soil is aerated to increase penetration of water
Compost trimmings and yard waste	Grass trimmings left in place whenever possible; other yard waste composted off site and returned as soil amendments
Solid Waste Management/Source Reduction and Recycling	
Actions Implemented	Comments
Set internal source-reduction policy to reduce paper consumption, limit use of disposables, conserve office supplies, eliminate unnecessary items	Begun in 1993; monthly accounting reports are copied on both sides; travel forms are being automated
Increase employee use of recycling programs by improving education	Begun in 1994; most documents are shredded into fibers too short for recycling so this material is composted with yard waste
Emphasize purchase of recycled and source-reduced supplies	Begun 1993; copier paper contains 30% post-consumer and stationery contains 20% post-consumer products
Investigate eliminating or recycling styrofoam in the cafeteria	Begun in 1993
Collect nickel-cadmium batteries for recycling	Begun in 1994
Place recycling bins in residence living area	Completed in 1994
Increase composting of yard waste	See landscaping; yard waste composted off site and returned as soil amendment
Make some special events as "green" as possible	Plan completed in 1994
Hazardous Waste/ Toxic Substances Management	
Actions Implemented	Comments
Complete agreement between residence and OEOB to ensure that all hazardous waste brought to OEOB storage shed is managed soundly and in accordance with regulations	Agreement completed in 1994
Consolidate all hazardous waste storage for solvents in OEOB storage cabinet; eliminate satellite storage	Completed in 1993
Improve recordkeeping, centralize records, document spill control equipment	Completed in 1994
Reduce indoor pesticide use	Begun in 1994
Obtain licenses for pesticide applicators	Licenses obtained as soon as possible
Ensure that transformers do not contain PCBs or treat as PCB-contaminated; if contaminated, clean up and provide protective clothing; consolidate records	Completed in 1994
Build new non-PCB transformer vault room	Completed in 1996

Managerial and Human Factors	
Actions Implemented	Comments
Establish a team of senior managers to create an environmental management program	Begun in 1993
Evaluate and catalog O&M procedures, integrate new O&M policies into existing procedures	Completed in 1994
Maintain water-saving devices to assure persistence of savings	Begun and ongoing
Carry out new executive orders that move federal procurement toward energy efficiency and environmental responsibility	Ongoing
Use available tools for green procurement (from GSA, DLA, etc.)	Ongoing; use lower emitting cleaning products and look for products with less packaging

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